

## TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

### REMOTE ACCESS TECHNOLOGIES FOR WASTE RETRIEVAL IN BUILDINGS 324 AND 327

**Identification No.:** RL-DD088

**Date:** November 2001

**Program:** 300 Area Facility Transition

**OPS Office/Site:** Richland Operations Office/Hanford

**PBS No.:** RL-RC06

**Waste Stream:** Exotic metals from research reactor materials testing

**TSD Title:** N/A

**Operable Unit (if applicable):** N/A.

**Waste Management Unit (if applicable):** N/A.

**Facility:** Buildings 324 and 327

#### **Priority Rating:**

This entry addresses the “Accelerated Cleanup: Paths to Closure (ACPC)” priority:

- ☒ 1. Critical to the success of the ACPC.
- ☐ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays).
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

**Need Title:** Remote access technologies for waste retrieval in Buildings 324 and 327

**Need/Opportunity Category:** *Technology Opportunity* -- The Site desires alternatives to the current or planned baseline technology/process (e.g., a baseline technology exists but can be improved).

**Need Description:** A variety of tools and techniques are needed for gaining access to “difficult to reach” spaces within high-radiation rooms, cells, tunnels and various waste site locations within the 324 and 327 Building. These access tools are primarily needed to help deploy visual characterization tools, support waste item / debris retrieval and possibly decontamination. This need statement is intended to cover remote access challenge that may not be directly addressed though RL-DD010 “Radiation Hardened Robotics for Building 324” and RL-DD079 “Improved Crane Technology for Building 324”.

#### **Schedule Requirements:**

Earliest Date Required: (01/2002)

Latest Date Required: (09/2007)

***Problem Description:*** A number of radioactive metals specimen areas storage areas within the 324 and 327 Buildings are presently inaccessible with in-house equipment.

Hundreds to thousands of Materials Open Test Assembly (MOTA) specimens are currently stored in the 324 Building's Shielded Materials Facility (SMF) South Cell (Room 140). The MOTA specimens are housed in two shielded storage caves located in the northeast and northwest corners of South Cell. Each cave is comprised of 13 drawers with up to 195 bins per drawer. Each cave has a shielded lid which, when lifted, also lifts and exposes the drawers. The MOTA specimens are typically a metallic vial (<1") composed of exotic metals from the Fast Flux Test Facility (FFTF) development and testing and from other worldwide programs. An overhead crane in the SMF South Cell would normally be utilized to gain access to the drawers by lifting the cave lid. However, the crane is inoperable, and the repairs cannot be accomplished due to the high source term currently in the cell. The weight of the cave lid greatly exceeds the payload capacity of the hot cell manipulators.

A wet basin once used for materials transfer between the 324 Building Cask Handling Area and the SMF hot cells was later abandoned by backfilling with sand and capping with concrete. A small portion of a transfer tunnel between SMF and the abandoned basin requires specialized equipment to access, inspect and retrieve any material/debris that may have been left from SMF operations.

Among others, another example of remote access challenges involves the 327 Building's Dry Storage Facility, which is comprised of an underground shielded area containing five stacked rotating tables equipped with storage cells. HEPA filtered exhaust is provided to the storage facility for contamination control. A special transfer cask was designed with a suction tool that is utilized to transfer samples into and retrieve them from the facility. Archive test samples have been accumulated in "soup" sized cans in this facility for the past 40 years. A concerted effort has been made in the past two years to remove these archived fuel and structural material samples. Samples are highly radioactive and some contain fissile material. To date, nearly 300 samples have been successfully removed. However, due to technical difficulties, several samples are not retrievable using standard transfer techniques. An additional sample has been identified on the floor of the facility under the bottom shelf. In addition, a video inspection has identified several storage positions with items that appear to be non-containerized samples that also cannot be removed by conventional methods. The only access to the Dry Storage Facility is through five 2" access ports at floor level. Technique and tooling needs to be developed to retrieve these samples in support of facility deactivation.

***Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation:*** In most cases, the new tools will be viewed as "enabling" technologies, and would not necessarily represent a cost saving unless comparing the alternative of doing nothing and therefore delaying deactivation progress.

***Benefit to the Project Baseline of Filling Need:*** Benefits realized by the Projects should include characterization task efficiencies/schedule reduction, waste volume/class reduction and the reduction in associated disposal costs. Dose reduction and ALARA-based improvements should also be realized.

***Relevant PBS Milestones:***

TRP-06-921	324 Deactivation Complete	September 22, 2006
TRP-07-930	327 Deactivation Complete	September 7, 2007

***Functional Performance Requirements:*** Remote systems must be able to perform remote activities requiring a range of motions and weight requirements in high-radiation fields (on the order of 2,000 to 5,000 R/hr). The associated tooling may be operated pneumatically, hydraulically, or electrically, but must be able withstand the harsh environments of the hot cells.

***Work Breakdown Structure (WBS) No.:*** 1.04.10, 324/327 Buildings Stabilization/Deactivation

***TIP No.:*** N/A

***Justification for Need:***

***Technical:*** Adequate characterization will be used to perform the Final Hazards Analysis prior to completing deactivation end points.

***Regulatory:*** Tri-Party Agreement Milestone M-89-00: Complete Closure of the Non-permitted MW Units of the 324 REC, HLV and LLV by October 2005. The 327 Building contains no TSD units; only the generating facility requirements of RCRA apply.

***Environmental Safety and Health:*** Supports as low as reasonably achievable (ALARA) and radiological mapping for future decontamination and decommissioning (D&D) efforts.

***Cultural/Stakeholder Concerns:*** Reduce employee exposure to toxic and/or radioactive materials. Better characterization data will lead to better and more cost-effective decontamination/removal decisions, thus minimizing quantities of materials handled, stored, or disposed of as a waste product.

***Other:*** None identified.

***Current Baseline Technology:*** In some cases, a baseline technology does not exist, and with therefore be viewed as “enabling”. Other baseline methods involve the use of specialty tools designed to be deployed from an overhead crane (if operating) or hot cell manipulator arms.

**End-User:** EM-60.

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